



A.D. 1841 N° 9026.

S P E C I F I C A T I O N

OF

WILLIAM HENRY PHILLIPS
AND
DAVID HICKINBOTHAM.

CONSTRUCTION OF CHIMNEYS, FLUES, &c.;
APPARATUS FOR VENTILATING THE SAME,
AND FOR VENTILATING AND WARMING
BUILDINGS, &c.

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Construction of Chimneys, Flues, &c.; Apparatus for
Ventilating the same, and for Ventilating and
Warming Buildings, &c.

PHILLIPS AND HICKINBOTHAM'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, WILLIAM HENRY PHILLIPS, of Manchester Street, Manchester Square, in the County of Middlesex, Civil Engineer, and DAVID HICKINBOTHAM, of the same place, Gentleman, send greeting.

5 WHEREAS Her present most Excellent Majesty Queen Victoria, by Her Royal Letters Patent, under the Great Seal of Great Britain, bearing date at Westminster, the Thirteenth day of July, in the Fifth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said William Henry Phillips and David Hickinbotham, Her especial licence, full power, sole
10 privilege and authority, that we, the said William Henry Phillips and David Hickinbotham, our executors, administrators, and assigns, and such others as we, the said William Henry Phillips and David Hickinbotham, our executors, administrators, or assigns, should at any time agree with, and no others, from
15 time to time and at all times during the term of years therein mentioned, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick upon Tweed, our Invention of "CERTAIN IMPROVEMENTS IN THE CONSTRUCTION OF CHIMNIES, FLUES, AND AIR TUBES, WITH THE STOVES AND
OTHER APPARATUS CONNECTED THEREWITH, FOR THE PURPOSE OF PREVENTING THE
ESCAPE OF SMOKE INTO APARTMENTS, AND FOR WARMING AND VENTILATING
20 BUILDINGS;" in which said Letters Patent is contained a proviso obliging the said William Henry Phillips and David Hickinbotham, by an instrument in writing under our hands and seals, or under the hand and seal of one of us,

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particularly to describe and ascertain the nature of our said Invention, and in what manner the same is to be performed, and to cause the same to be inrolled in Her Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at 5 large appear.

NOW KNOW YE, that in compliance with the said proviso, we, the said William Henry Phillips and David Hickinbotham, do hereby declare that the nature of our said Invention, and the manner in which the same is to be performed, is particularly described and ascertained in and by the following 10 description thereof, reference being had to the Drawings hereunto annexed, and to the letters and figures marked thereon, (that is to say) :—

Our improvements in the construction of chimnies, flues, and air tubes, with the stoves and other apparatus connected therewith, for the purpose of preventing the escape of smoke into apartments, and for warming and ventilating 15 buildings, are represented in the accompanying Drawings, and will be fully understood by the following description thereof. Fig. 1 represents the section of a building in which a series of fire-places are shewn arranged over each other in a perpendicular line, with air flues or passages extending from the under part of each fire-place down to a well or air chamber in the base of the 20 building. In this Figure it will be seen that every flue extends both upwards and downwards from the respective fire-places as a sound and separate flue, having no communication with any other flue but the general air chamber H at bottom, which chamber may be constructed sufficiently large to allow a person to work the sweeping apparatus up and down the air flues F and the chimnies G, and 25 to remove soot from the chamber H, without going into the several apartments. When two or three air flues branch off to the fire-places from a single flue, as shewn in Fig. 2, then instead of passing the sweeping apparatus in at the lower part of the air flue, as in Fig. 1, we find it more convenient to apply soot doors at the upper part of the chimnies, and to work the sweeping 30 apparatus downwards through the soot doors or openings z, at the upper part of the chimnies, and allow the soot to fall down the chimnies and air flues into any convenient receiver placed below. And we advise that the best method of building or constructing flues is according to the plan shewn in Fig. 1, as above described, but when the fire-places cannot be conveniently situated in a per- 35 pendicular line over each other, and when it would be inconvenient to make a separate flue leading down from the respective fire-places, in those cases, to modify our plan, we make two or more flues to communicate below and become one flue, as in Fig. 2 ; but those parts of the flues or chimnies through which the

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smoke or heated air is to ascend must be kept independant of each other, and not
 open into any other flue. All that has been herein-before described is applicable
 to the wings of buildings, or to sets of rooms, or houses that stand detached, and
 it is important to be known that to prevent a return of smoke into apartments,
 5 the tops of the chimnies of any low buildings should extend to the height of an
 oblique line drawn from the top of the highest contiguous building, forming an
 angle of twenty degrees with a level or horizontal line, as shewn in Fig. 2.
 Fig. 3 is the front elevation of a stove of the common form, the breast of the
 chimney being represented in section for the purpose of shewing the arched
 10 bar on which the brick work rests. Fig. 4 is a transverse vertical section of the
 same. Fig. 5 is a horizontal section taken through about the middle of the
 fire-grate. *a* is the grate, the back and sides of the fire being surrounded by
 an air chamber *b*, in which chamber are small holes *c* to admit air to the fire at
 the sides. *d* is a valve for the purpose of regulating the draught of air from
 15 the flue *F* into the chamber *b*; several gratings or sieves *e, e*, are placed
 resting upon the bar *f*, upon which bar they may be moved backward or
 forward, as upon a hinge joint, and are kept in their proper position by the
 button *g* bearing against the upper part of the stove, as shewn in the Drawing.
 One of these gratings or sieves is represented detached in elevation and section,
 20 Figs. 6 and 7. The bars and spaces of the second sieve are smaller and more
 numerous than the first, and the bars and spaces of the third sieve are still
 smaller and more numerous than those of the second sieve, and so on to any
 required number. A plate *h* turns upon the bar *f*, and is shewn thrown back
 across the flue in order to check the air from passing up from the flue *F* into the
 25 chimney *G*, and when it is found necessary to sweep the chimney the gratings
 or sieves *e, e, e*, are let down forward, and the plate *h* is brought to their
 previous position to prevent soot from falling into the room in its passage
 down the flue *F*. An arched bearing bar *i* supports the brickwork of the
 chimney *G*, the front and sides of which we prefer constructing, or as com-
 30 monly called gathering in, at an angle of twenty degrees from a perpendicular.
 The action of this stove is as follows:—The heat of the fire causes air to draw
 up the flue *F* into the chamber *b* through the holes at the sides of the grate
 into the fire; the smoke and flame of the fire spreads between the gratings *e, e*,
 where the smoke and deposits of soot are in a great measure consumed, and
 35 heat is imparted to the air in its passage from the room to the chimney *G* by
 passing through the series of sieves, and thereby promotes the draught of the
 chimney. Fig. 8 is a front elevation of another construction of stove, and
 Fig. 9, a transverse vertical section of the same, Fig. 10 being the horizontal
 section or plan. *j* is the grate containing the fire, at the back of which is a

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boiler *k* containing water, having a space *l* between them, forming a passage for steam into the back part of the grate. The boiler is supplied with water in the ordinary way, and steam passes into the space *l* at the back of the grate, and through apertures into the fire, which supply of steam causes a greater intensity of heat to be produced, and more perfect combustion of the fuel and smoke to take place, and also creates a greater draught in the chimney, and consequently through the tube *D*, which is made available to draw air out of rooms required to be ventilated. The pipes *m, m*, conduct the air as it passes up from the pipe or air passage *D*. *n* is a close screen or casing, made of sheet metal or metal frame work, having panes of talc or glass. This screen surrounds the front of the fire-place for the purpose of preventing currents of air in the room passing up the chimneys, and by enclosing the fire, preventing the return of smoke from the chimney; this screen causes the draught of the chamber to be supplied with air through the passage *D* from rooms in different parts of the house. Fig. 11 represents the section of a building containing many apartments. *E* is a tube or air passage leading from the external atmosphere to the lower part of a room *A, A, A*, in which room or chamber the stove *j*, before described at Figures 8, 9, 10, is placed. From the upper part of the room *A*, there is a pipe or air passage *I*, having branches leading into the several apartments *B, B, B*, of the house, and terminating in each room in a star-formed apparatus of pipes attached to the ceiling, by which pipes the air from the room *A* is conducted into those several apartments for the supply of fresh air. Fig. 12 is a horizontal representation of the star-formed apparatus, through which fresh air is delivered; at the upper part of the room a trumpet-mouthed tube *D* passes through its centre for the purpose of carrying off impure air from the room. Fig. 13 is a transverse vertical section of the star *p, p*, the pipe *I*, and the trumpet-mouthed tube *D*, for the supply of fresh and the abstraction of foul air. *O* is a cylindrical air chamber connected to the tube *I*, and *p, p*, are the radial arms or discharging tubes, open at the ends to allow of the passage of the fresh air in the room. The branch of the exhausting tube or air passage *D, D*, having a trumpet mouth, passes through the centre of this cylindrical chamber. When the stove *j* is in full operation, and the fire is inclosed by the screen, a current of air, as before said, passes through the tube or air passage *E* into the room *A*, and is warmed by the radiating heat of the fire from the stove *j*; the warmed air then proceeds out of the room *A* by the channel and branches *I, I*, and through the distributing stars *p, p*, into the different rooms *B, B, B*. The air that may have been rendered impure by respiration, or the combustion of lamps or other lights, is drawn off through the trumpet-mouthed pipe *D*, and thence proceeds to the

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interior of the casing that incloses the fire, as shewn in Figures 8 and 9, whence it passes up the chimney J of the stove. When it is required to ventilate an extensive mansion or other building, or several houses at the same time, it will be advisable to use the apparatus which we are about to describe.

5 Fig. 14 is a front elevation of this apparatus ; Fig. 15, a tranverse vertical section of the same ; Fig. 16, a horizontal section taken at a level between the bottom of the steam boiler and the circular fire-grate. q is a boiler, in which steam is generated by the fire contained in the circular grate r , which is surrounded by two rings of iron s, s , the outer one of which is conical. These

10 two rings are so connected together at bottom as to form a channel t , into which steam and air are admitted by the pipes u and v . w is the door through which fuel is supplied to the fire. x is the ash pit door, made to shut close. In order to effect the combustion of smoke, a current of air, having entrance by the pipe v , is circulated in the channel t by the force of a current of steam

15 from the pipe u , and in consequence of the conical inclination of the outer ring s, s , a spiral expanding circular whirlwind motion of the aeriform gaseous and ponderable products of heated air, steam, and smoke takes place round about the fire and lower part of the boiler in such manner as to effect the combustion of the smoke emitted from the fuel. In Fig. 11 is shewn two purposes

20 for which a steam boiler is used in warming and ventilating buildings. One use is to warm the air in an apartment K by coils of a steam pipe or any other convenient warming surfaces. Air is admitted into the apartment K from without through apertures y, y , at the lower part of the room, which apertures are covered with gauze wire work or perforated metal. Another use to

25 which steam is applied in this Figure is to give motion to fans at the upper part of the chimney. Fig. 17 represents a sectional elevation of the exhausting apparatus ; Fig. 18, a horizontal view of the same, which apparatus is to be placed at the top of the chimney F, as in Fig. 11. A steam pipe z passes up the middle of the shaft F, and is attached at top to framework a ; this frame-

30 work a has a centre pin b , which receives the socket c , fixed at the top of a tube d , inserted into the top of the steam pipe z . This tube d is partially shewn detached and in section, Figs. 19, with a shaft e , carrying vanes or a spiral plate f fixed within the tube d . The lower end of this shaft is pointed, and works on the top of a socket fixed in the upper part of the steam pipe z , and

35 by the ascent of the steam up the pipe the vanes f , with the tube d , are made to revolve, carrying the arms or fan h rapidly round. The steam acting against the vanes or archimedian screw, as described, causes the tube d , with the fans h , to revolve with such velocity as to throw off currents of air (or smoke when there is any) from out of the flue F into the open air, thereby producing a

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partial exhaustion of the air in the chimney or shaft or air flue F, Fig. 11, and also drawing the foul air from the tube D communicating with the several rooms under ventilation. In Fig. 11, air passes into the chamber K by the apertures *y, y*, and when it is required to supply one or more buildings with warm air, an adequate quantity of steam pipe may be coiled about in the room or chamber K. The air is drawn out of the chamber K by the force of the fans working on the shaft F, the air first passing along the air channel I¹, I¹, into the dispersing stars *p, p*, of the rooms R, R, R, R, Fig. 11; from these rooms currents of air return by the branches D¹ to the ventilating flue F, Fig. 11, and are finally discharged into the atmosphere by the force of the fans on the chimney F, worked as before described, Figures 17 and 18; and this arrangement, wherein a steam boiler is employed, we recommend when the rooms of many houses or a great extent of building is to be warmed and ventilated by one process. Fig. 20 is a partial sectional elevation of a kitchen stove or range. Fig. 21 is a horizontal plan, shewing the top of the stove and oven. *i* is the oven. *j* is a flue leading from the back of the fire, and passing into the chimney. *k* is a steam pipe leading from the boiler *l* into the flue *j*, having a stop-cock to shut off or let on the steam. When steam passes into the flue *j* a rapid draught of burnt air is carried through the same, which by heating the pipe or flue *j*, increases the heat of the oven, and further promotes the draught of the chimney G. The quantity of hot air thrown into the chimney G and the heat of the oven may be regulated by the admission of more or less steam, which is controlled by the use of the stop-cock. Fig. 22 is another construction of rotary apparatus to work the flyers of a smoke jack for promoting the draught of a chimney. *m* is a steam pipe, connected to the boiler of a kitchen range or other steam generator. *n* is an iron stay or bracket to support the steam pipe and other parts of the apparatus. The upper branch of the iron stay is formed into a collar, which carries a centre pin *o*, to which the flyers *p* are attached; to the lower part of this centre pin *o* a metal tube *q* is connected, within which are the vanes *f, f*, or the archimedian screw. These vanes, with their central shaft *e*, are made fast to the tube *q*, and revolve together, the lower end of the shaft *e* having a point or pivot working in the socket *r* formed in a bar crossing the top of the steam pipe *m*. At the upper end of the centre pin *o* there is a worm shaft taking into a toothed wheel *s*, which wheel is the ordinary connection for driving the roasting spit, as applied in common, and hence by the rotation of the tube *q* and flyers *p* the jack is driven, the rapid motion of the flyers having the effect of increasing the draught of the chimney G. Fig. 23 represents the elevation of another form of stove, having a confined fire, which stove may be applied to aid the

FIG. 1.

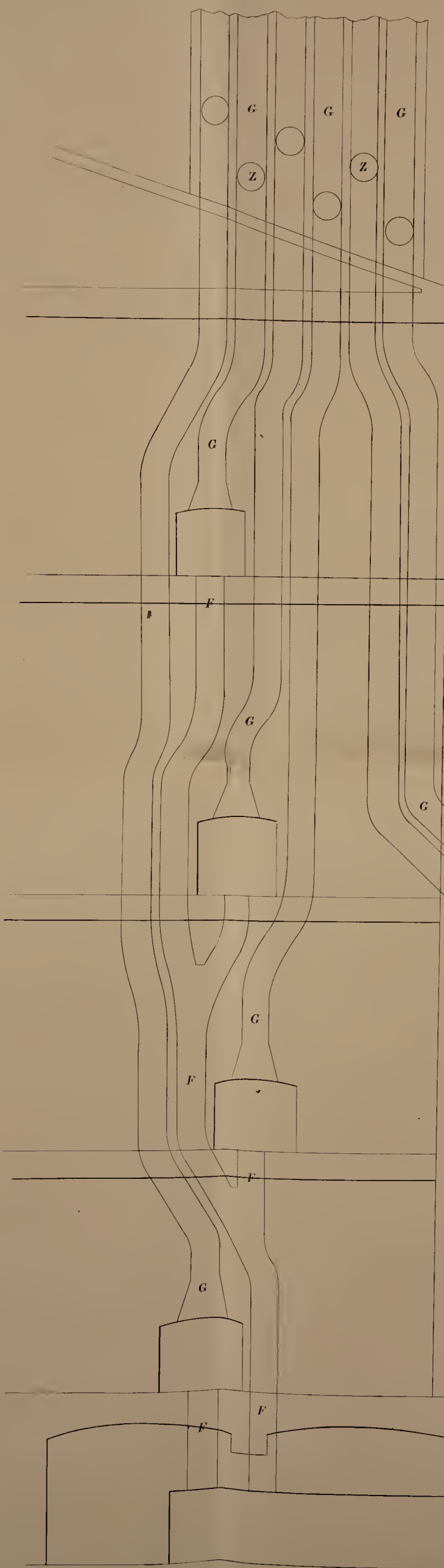
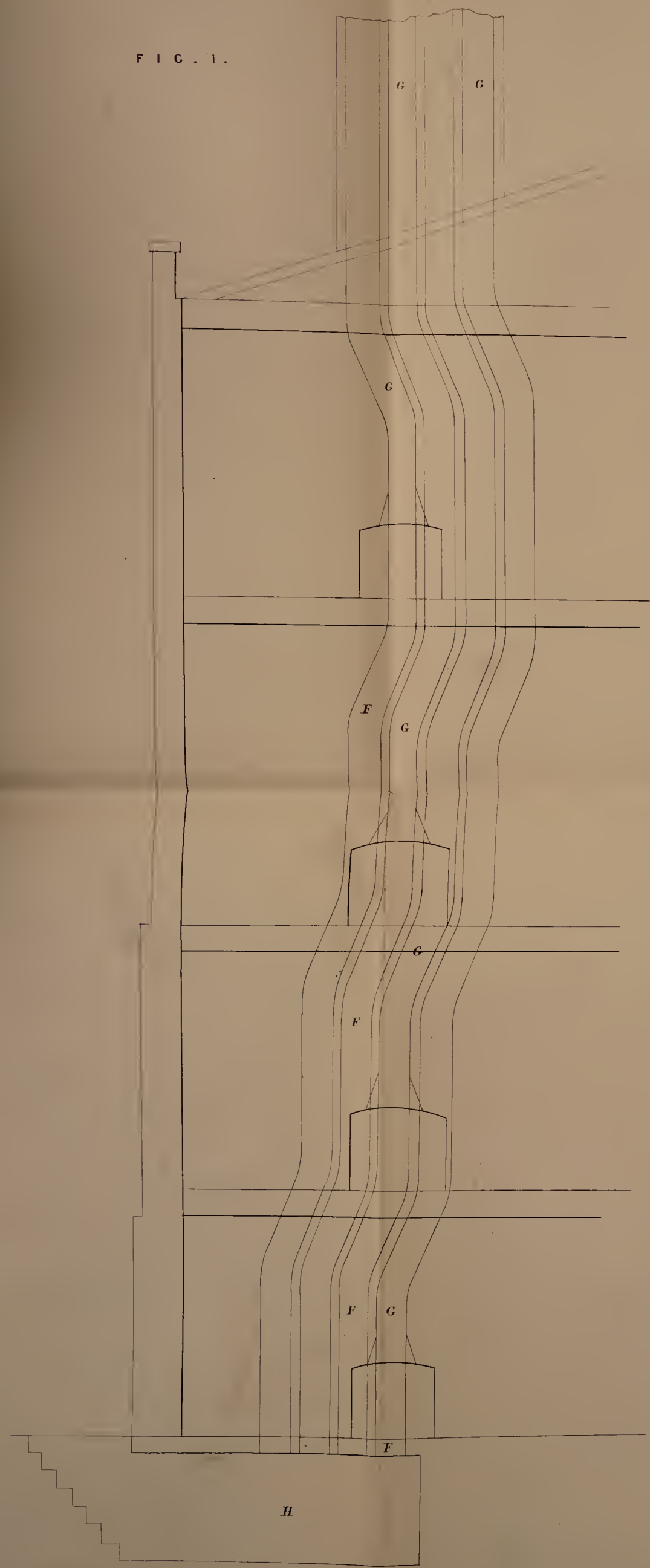


FIG. 2.

FIG. 28.



FIG. 29.



FIG. 31.



FIG. 30.

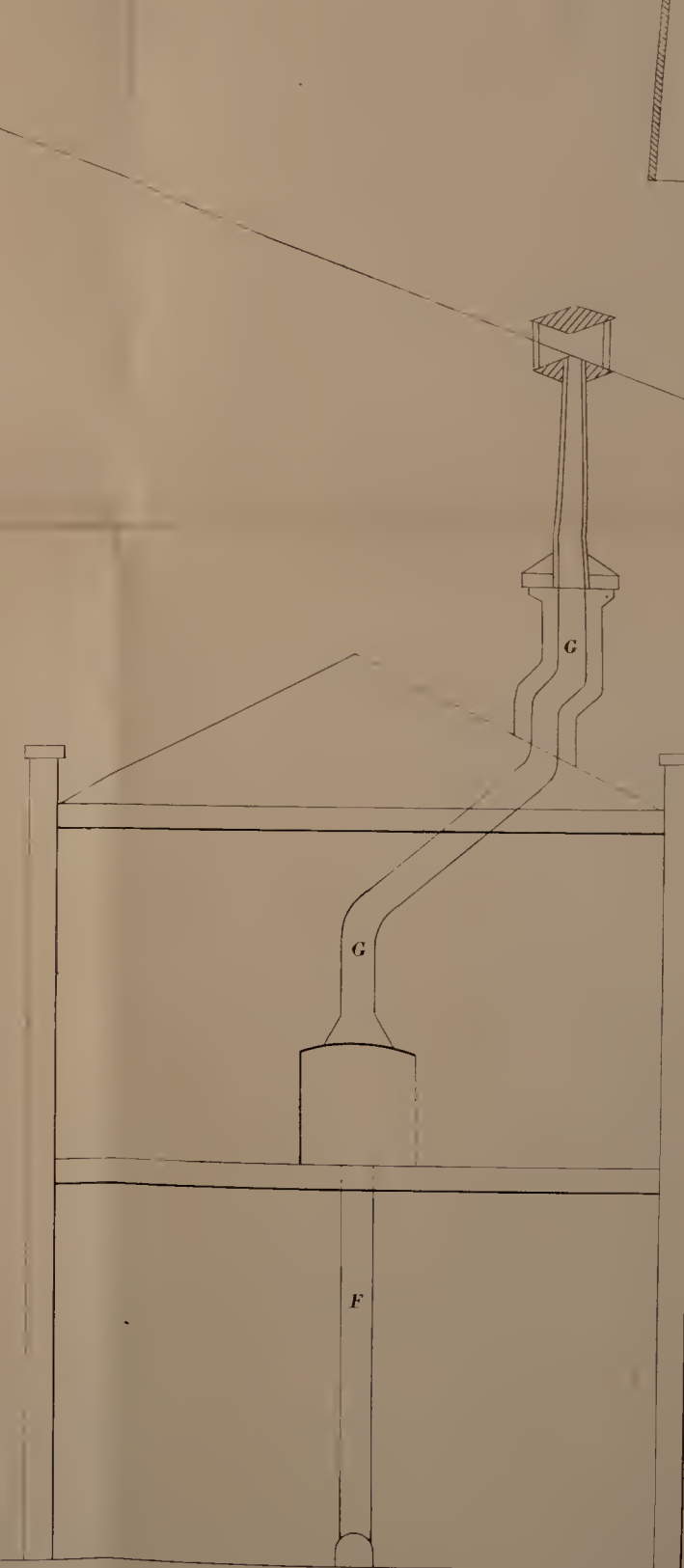




Fig. 3.

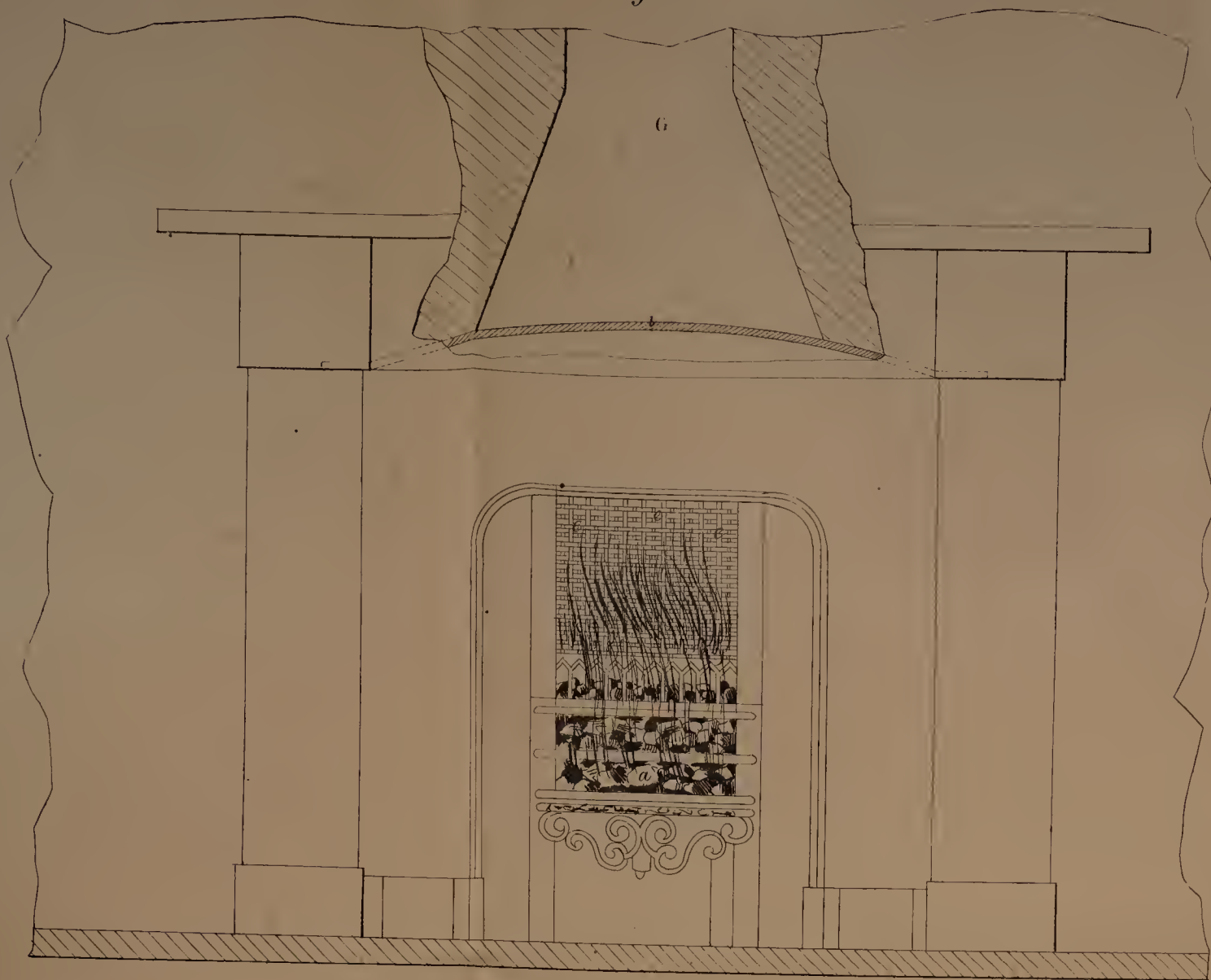


Fig. 4.

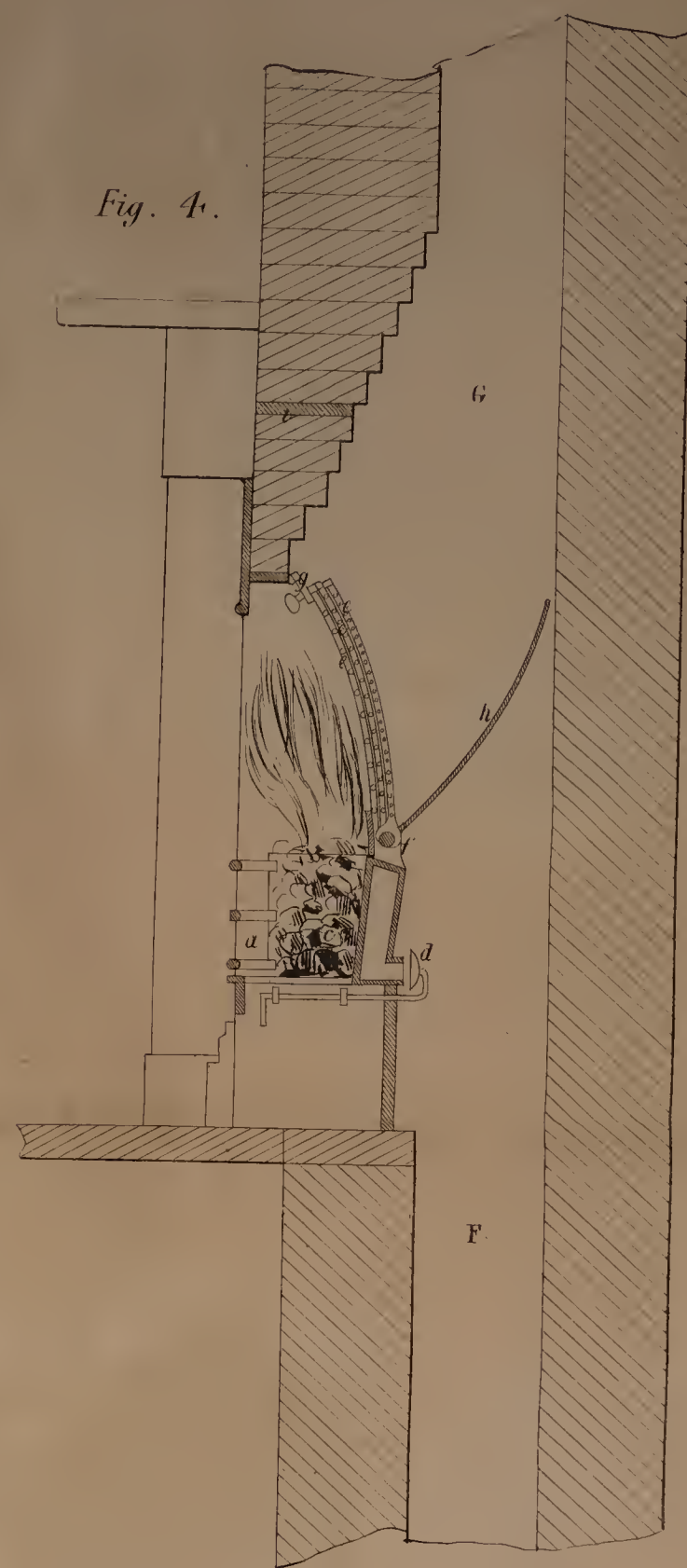


Fig. 4.

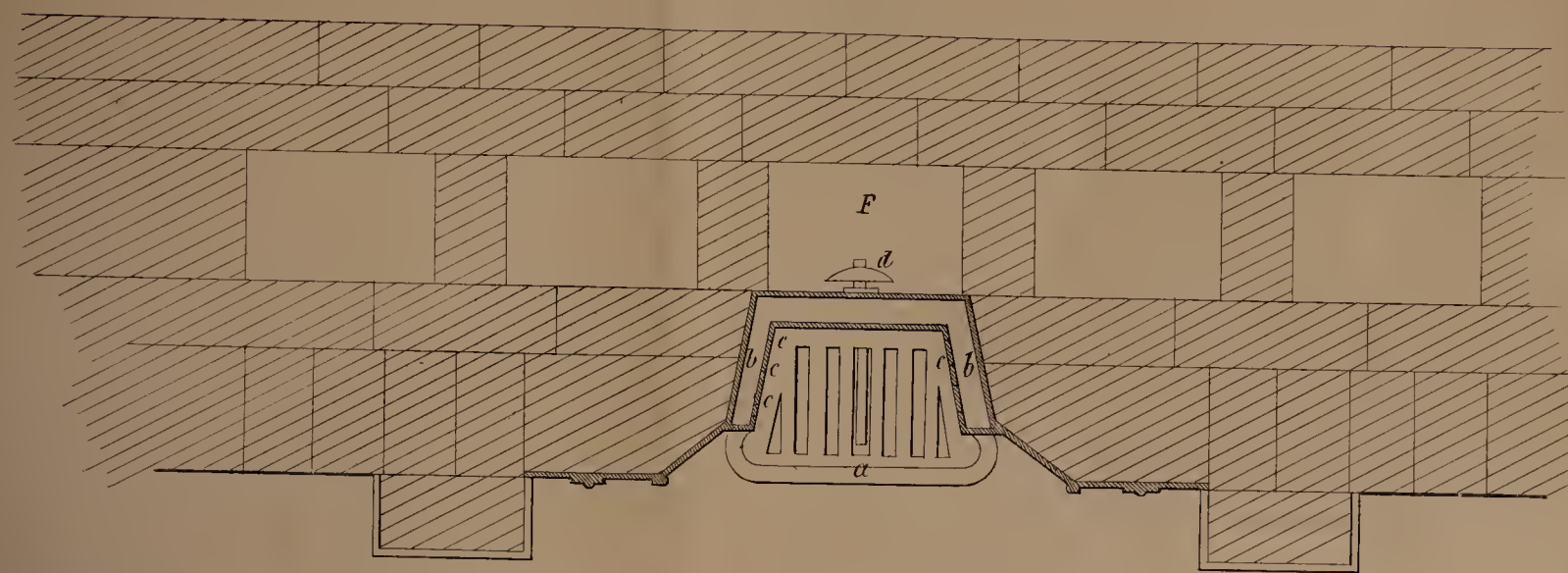


Fig. 6.

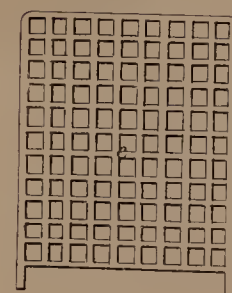


Fig. 7.



Fig. 8.

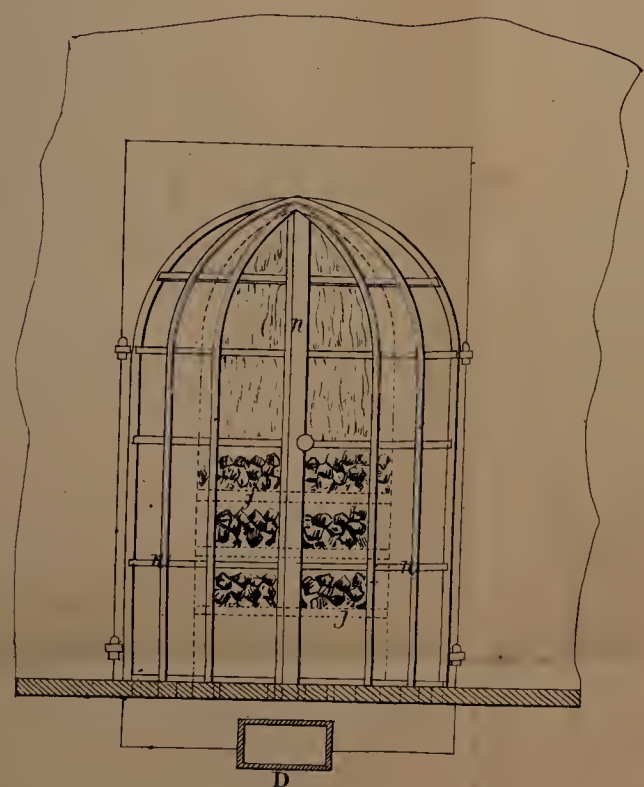


Fig. 9.

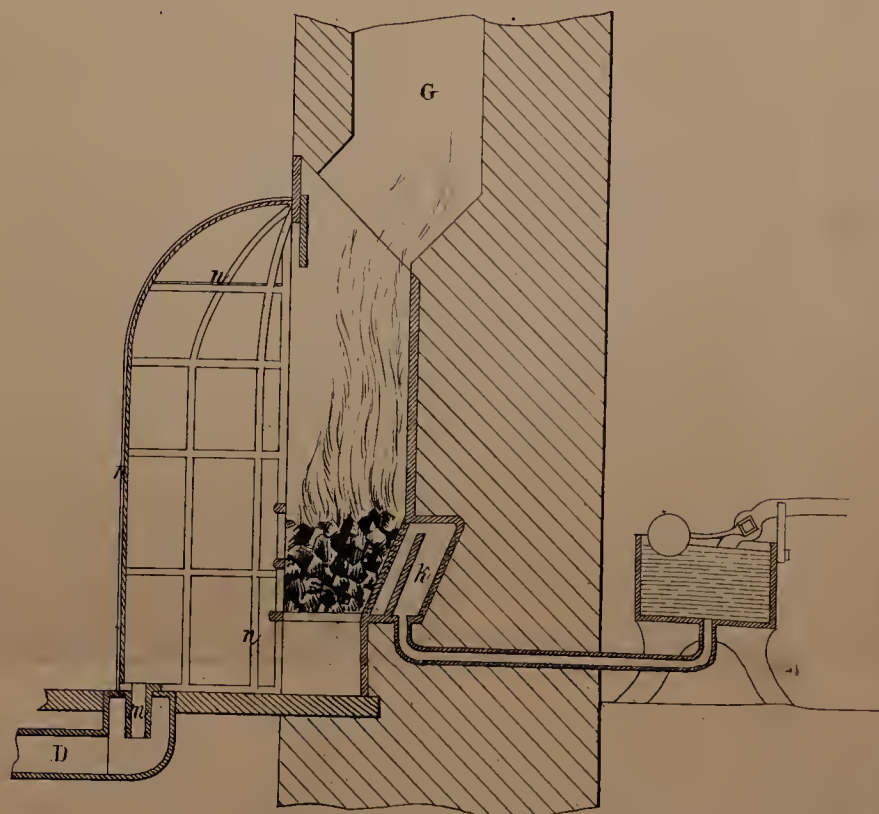


Fig. 26.

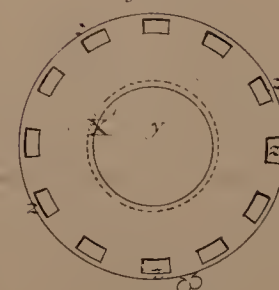


Fig. 25.

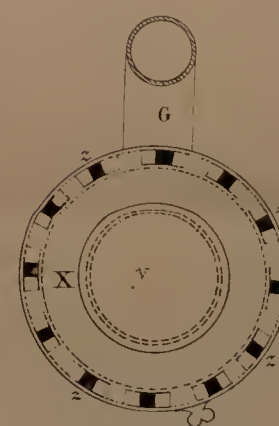


Fig. 10.

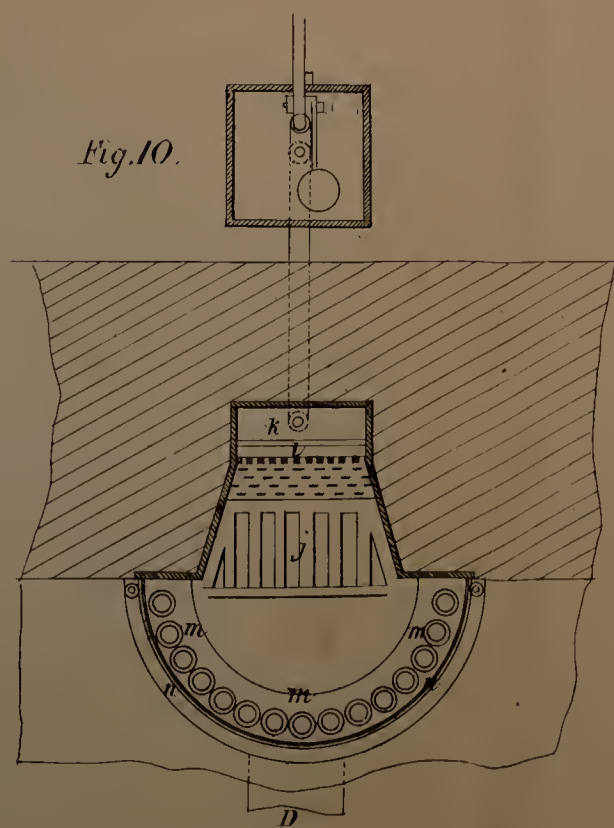


Fig. 24.

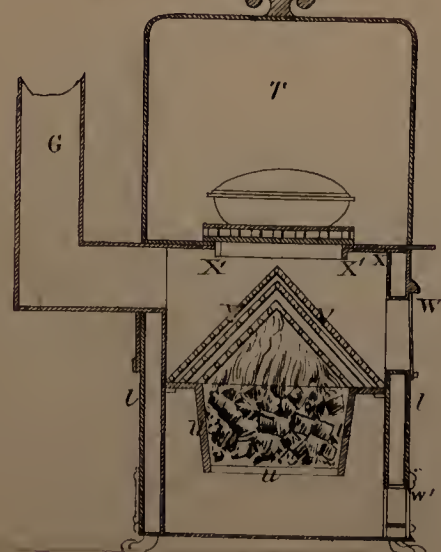


Fig. 23.

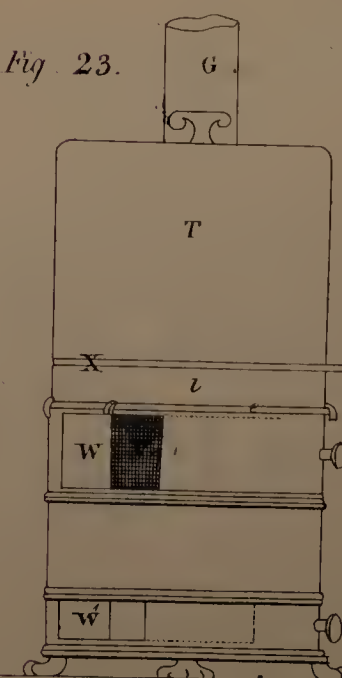


Fig. 27.

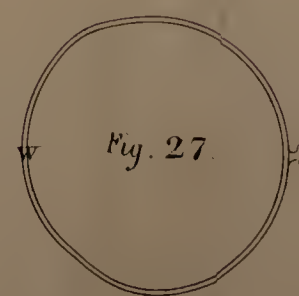


Fig. 20.

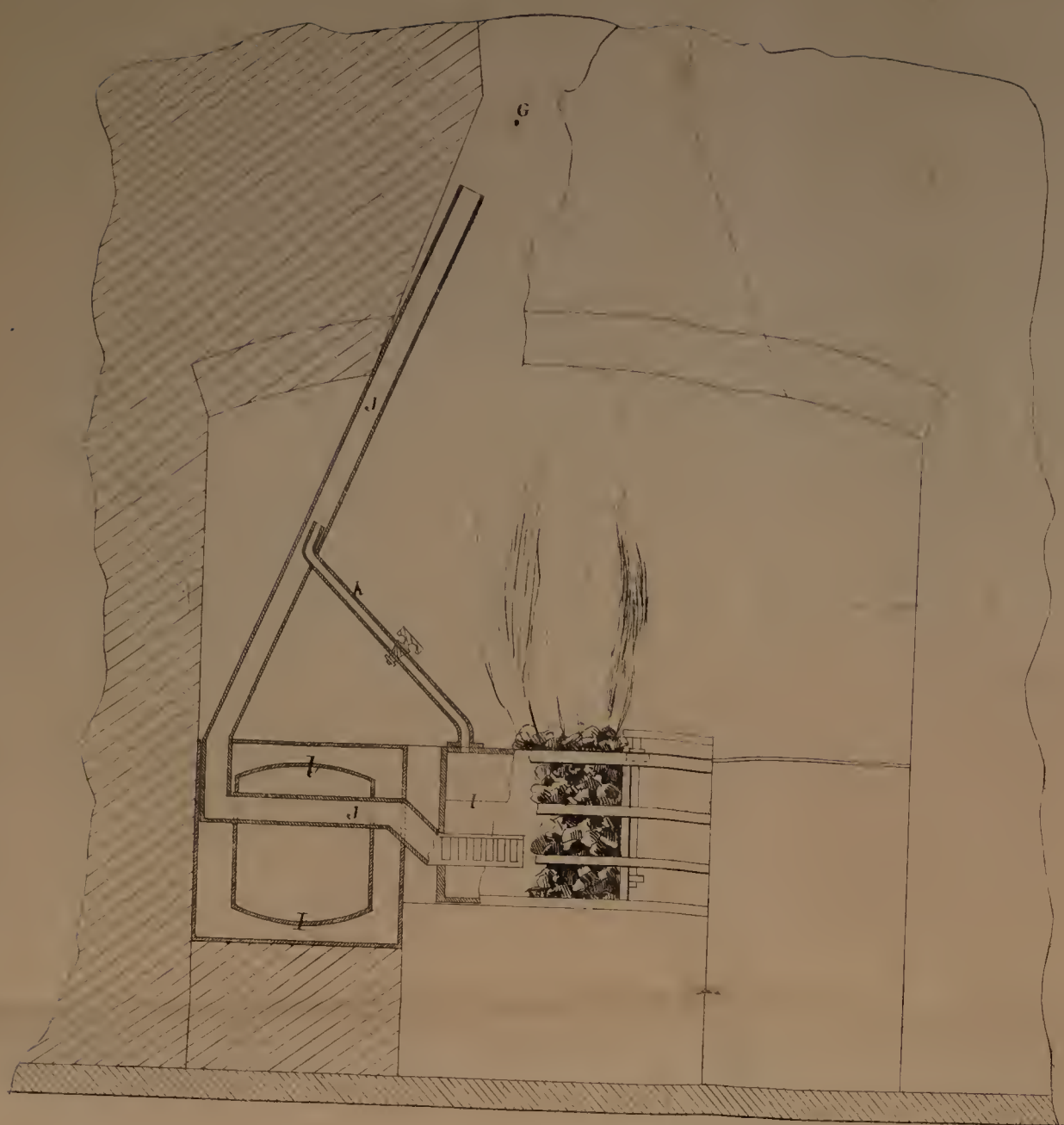


Fig. 18.



Fig. 19.

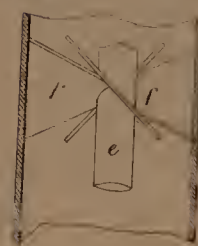


Fig. 17.

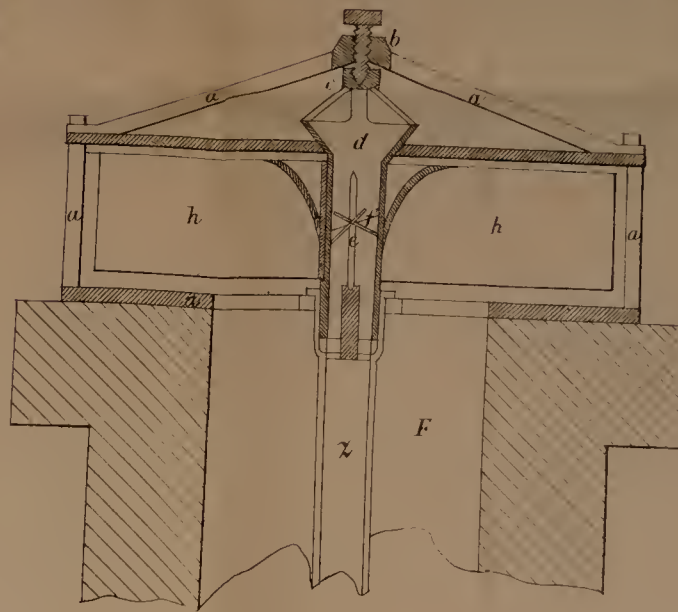


Fig. 21.

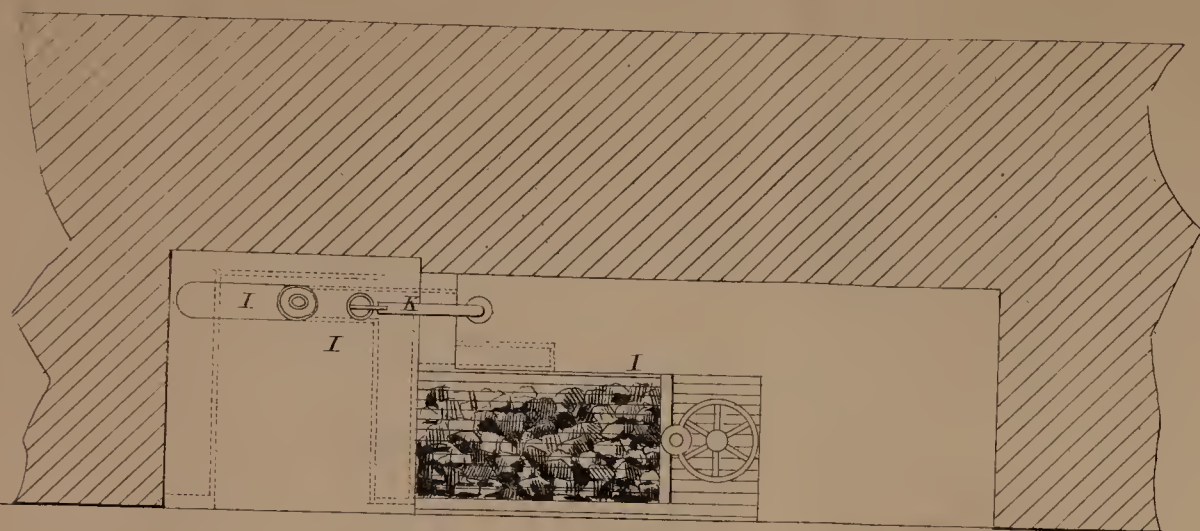


Fig. 15.

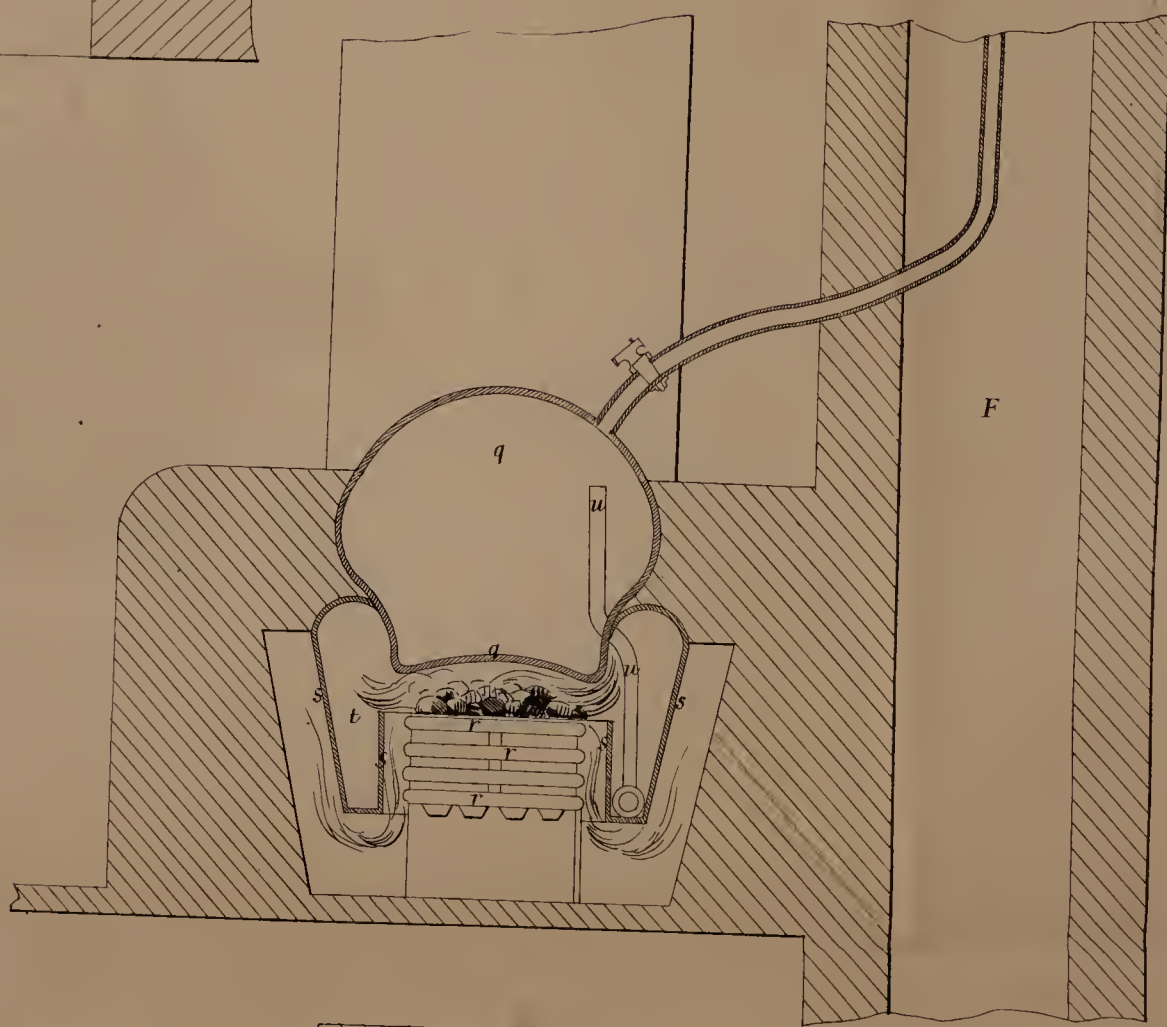


Fig. 14.

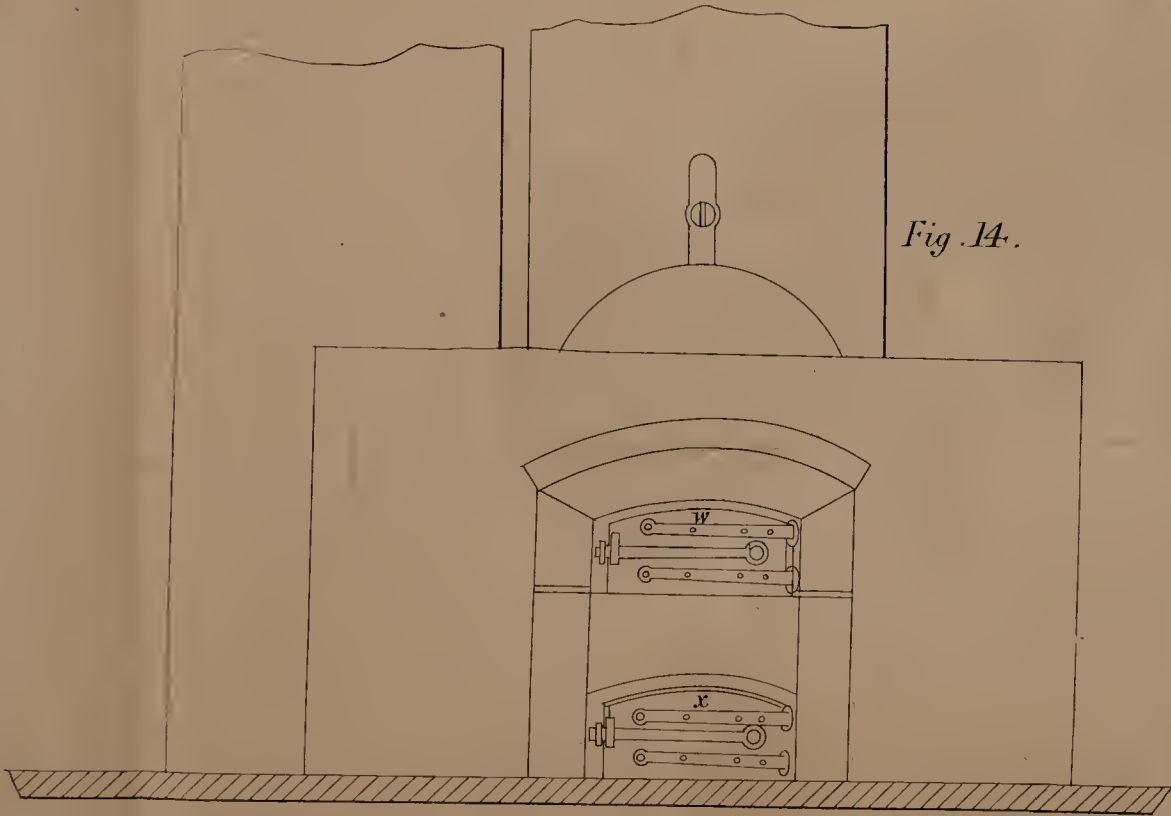


Fig. 22.

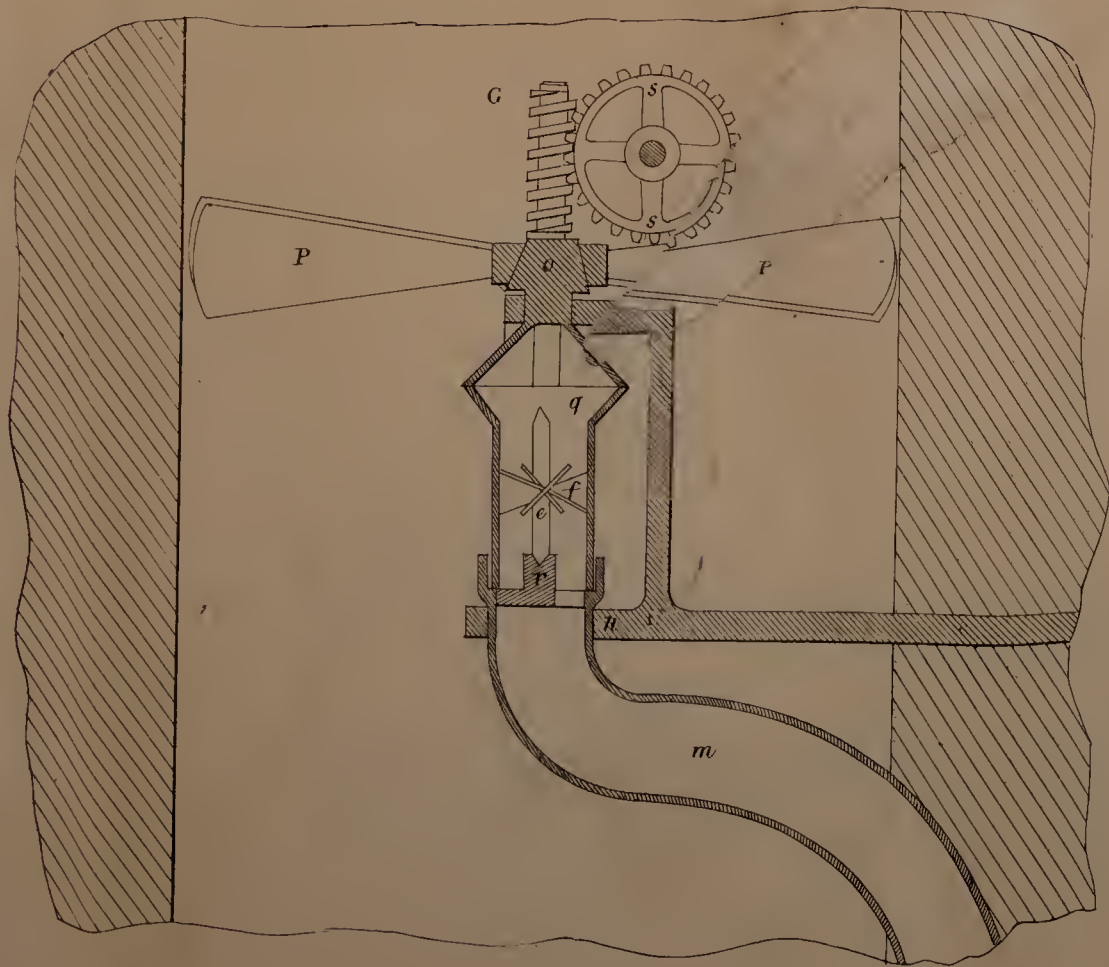


Fig. 16.

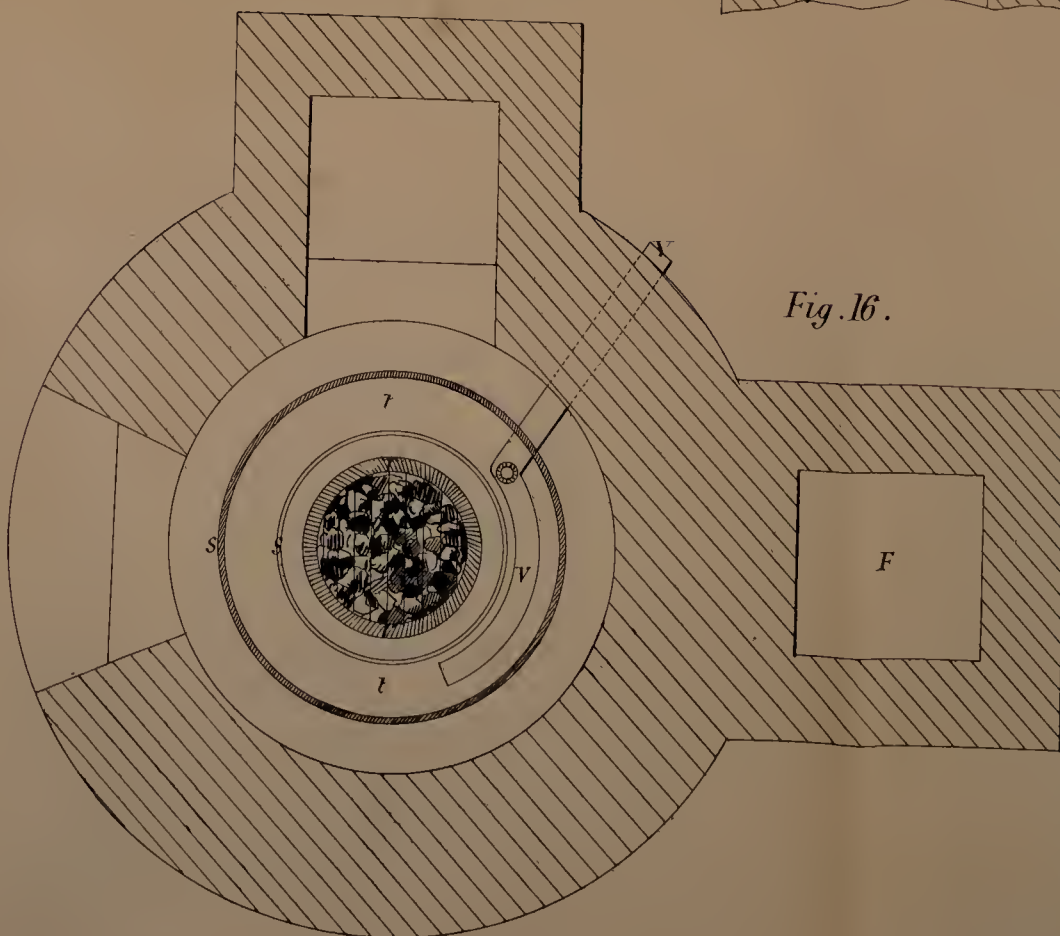


FIG. 11.

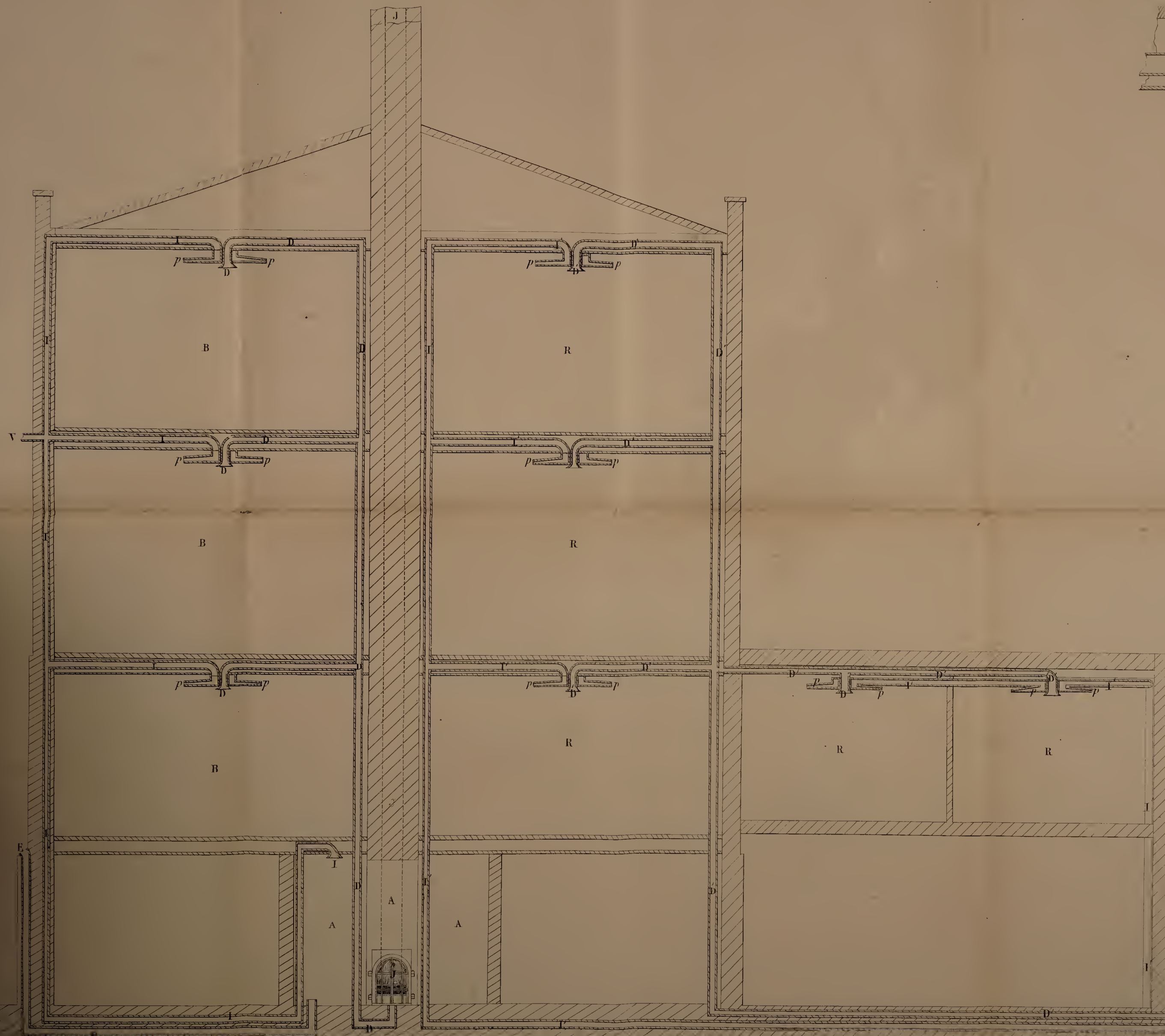


FIG. 13.

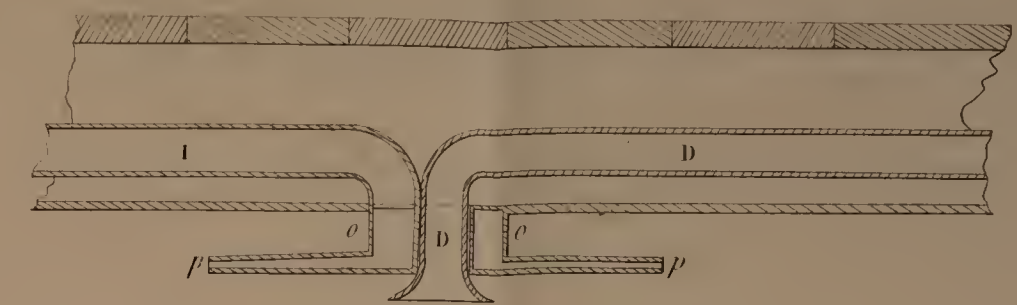
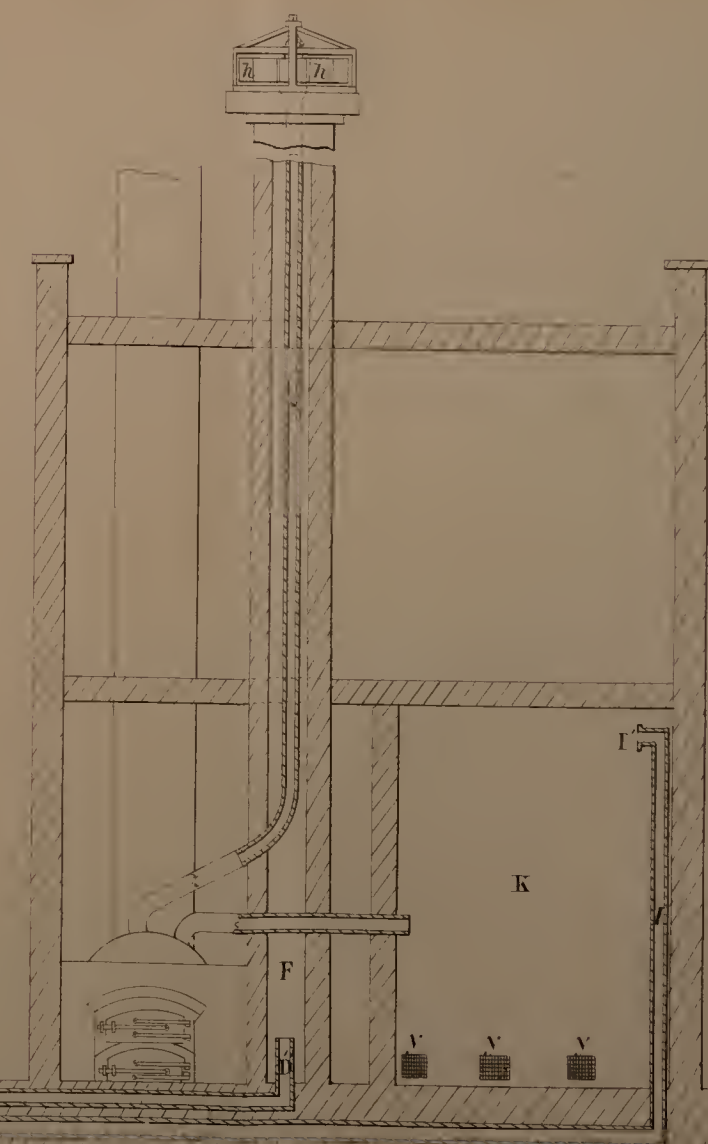
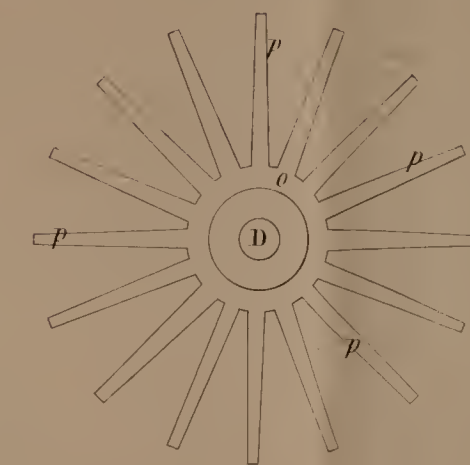


FIG. 12.



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draught of a chimney; the sliding doors of the fire and of the ash pit are shewn partly open in this Figure. Fig. 24 is a vertical section through the middle of the stove and upper chamber or oven. Fig. 25 is a plan of the top of the stove, with the cover removed, shewing the manner in which the apertures for admitting hot air into the oven are regulated. Fig. 26 is a detached view of the regulating plate. Fig. 27 is a plan of one of the belts forming the doors. This circular stove is formed with a jacket *t, t*; in the inner casing is placed the grate *u* containing the fire. Over the fire are placed several conical covers of lattice or open wire work *V, V*, to intercept the smoke and prevent the flame from passing up the chimney *G*; the sliding doors *W, W¹*, are formed of about five-sixths of a ring or belt of metal, which can be slid right or left a sufficient distance to open or close the doorways. On the top of this stove is placed a metal plate *X*, having a circular hole *y* in the centre, and near the circumference are a series of equidistant apertures *Z, Z*. Upon this plate slides a second plate similar to the first, but having a ring *X¹*, projecting underneath, which passes through the hole *y* in the first plate, for the purpose of keeping the second plate concentric when moved by the handle. The fire is lighted in the usual way, and the sieves of lattice wire work are placed over the fire to intercept the smoke and flame between the fire and chimney; the sliding belts or doors are then shut, and a tile or plate of metal is placed over the hole or opening *y*; any article to be baked, heated, or dried can be placed upon the tile or plate of metal, and the cover *T* put in its place, as represented in the Drawing; more or less heat is admitted into the oven or chamber *T* by turning round the plate *X* so as to open or close the apertures *Z*. Fig. 28 represents the front view of the soot door and frame *Z*, which we apply to chimnies or flues in any convenient part, through which the sweeping apparatus may be passed for the purpose of sweeping the chimney. Fig. 29 is an edge view or section of the same. The advantage of this soot door over those commonly used is the simplicity of its construction, and shutting close. Fig. 30 is a vertical section of a chimney pot with our application of inclined surfaces for the purpose of aiding the draught of chimnies; and Fig. 31 is a perspective or bird's eye view of the same.

In witness whereof, we, the said William Henry Phillips and David Hickinbotham, have hereunto set our hands and seals, this Thirteenth day of January, in the year of our Lord One thousand eight hundred and forty-two.

WILLIAM HENRY PHILLIPS. (L.S.)
(L.S.) DAVID HICKINBOTHAM.

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W. BROUGHAM.

AND BE IT REMEMBERED, that on the same Thirteenth day of January, in the year above mentioned, the aforesaid William Henry Phillips and David Hickinbotham came before our Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and everything therein contained, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute in that case made and provided. 5

Inrolled the aforesaid Thirteenth day of January, in the year above written.

LONDON :

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1854.